

DEEPWORKER 2000 LAUNCH AND RECOVERY PROCEDURES FOR THE USNAVY YTT-11 *DISCOVERY BAY*

Reference: (a) *Final Cruise Plan and Interagency Agreement dated 17 June 1999*
(b) *Range Operating Policies and Procedures, ROP 8-1, Underwater Recovery Operations*
(c) *Alaska Marine Crane Model 12-40K, Knuckle Squirt Manual*
(d) *NSTM 589*

Enclosures: (1) *Bridge Checklist for Launch and Recovery of DEEPWORKER 2000*
(2) *Schematic of Deck Configuration and Recovery Procedure*

1. OBJECTIVE:

To establish specific procedures for the launch and recovery of DEEPWORKER 2000 from *DISCOVERY BAY* (YTT-11) in support of the Sustainable Seas Expedition in accordance with references (a) and (b).

2. SAFETY PRECAUTIONS:

- a. Chief Mate shall abide by all safety precautions and directives of reference (c).
- b. Launch and Recovery Operations shall be terminated when weather conditions do not warrant operations as determined by the Master or Dive Supervisor.
- c. Launch and Recovery Procedures involve lifting of personnel within a vessel that is innately buoyant. Guidance of reference (d) applies.
- d. Operators shall inspect all handling and rigging gear and ensure suitability prior to any lifts.
- e. The Dive Supervisor will hold a pre-dive and post-dive brief prior to any DEEPWORKER 2000 operations.

3. INFORMATION:

- a. DEEPWORKER 2000 is a one-person submersible about 8 feet long and weighing approximately 3500 lbs. (1300 kg.) Normal operations will not exceed 2.5 hours but sufficient atmosphere is available for 100 hours in an emergency. The craft is able to dive to 2000 feet. The acrylic dome, dome guard, and hull help protect the pilot from impact damage resulting from lift equipment failure.
 - b. The preferred lifting equipment for launch and recovery of the DEEPWORKER 2000 is the aft weapons crane located on the fantail. This crane provides the safest location for launch and recovery of the submersible because of minimization of ship and crane motions during the procedure.
 - c. DEEPWORKER 2000 shall have an acoustic tracking beacon installed and YTT shall deploy an acoustic tracker hydrophone. Personnel will ensure tracking of
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submersible using installed Trackpoint II or similar system at all times during the operation.

- d. Chief Mate will act as the primary coordinator of all DEEPWORKER 2000 launch and recovery operations on the fantail.
- e. Dive Supervisor will act as the primary coordinator of all DEEPWORKER 2000 dive operations and will coordinate the deployment of the Swimmer and Rescue Boat.

4. LAUNCH PROCEDURE: See Enclosure (1) for bridge checklist items

- a. DISCOVERY BAY will assume an anchored position or come to launch course for best ride to minimize pitch and roll. If maneuvering, DISCOVERY BAY will slow to 1 knot or less Speed Over Ground (SOG) and use only the forward Omnithruster.
- b. Light off aft weapons crane. Ensure normal operational checks are satisfactory. Install small doughnut ring on the snubber assembly.
- c. Ensure Swimmer is standing by on deck or in Rescue Boat.
- d. Deploy Rescue Boat.
- e. Attach lifting bridle and spreader bar assembly to hook of aft weapons crane.
- f. Swing crane into position above DEEPWORKER 2000.
- g. Attach tow line to bow of DEEPWORKER 2000.
- h. Attach tag-lines to port and starboard frame of DEEPWORKER 2000.
- i. Chief Mate initiates attachment of bridle assembly on DEEPWORKER 2000
- j. Chief Mate initiates lift of DEEPWORKER 2000.
- k. Chief Mate lifts and moves DEEPWORKER 2000 astern of fantail.
- l. Chief Mate lowers DEEPWORKER 2000 into water with dome awash.
- m. Dive Supervisor deploys swimmer to detach lifting bridle.
- n. Swimmer moves astern of DEEPWORKER 2000.
- o. Chief Mate slacks tow and tag lines to allow DEEPWORKER 2000 to drift further astern.
- p. Dive Supervisor directs swimmer to detach tow and tag lines.
- q. Swimmer stays clear of DEEPWORKER 2000 and returns to Rescue Boat.
- r. Pilot takes control of DEEPWORKER 2000 and commences mission.

5. LIVE SHIP RECOVERY PROCEDURE NORMAL: (See Enclosure (1) for bridge checklist items, Enclosure (2) for diagram of fantail configuration and recovery procedure)

- a. DEEPWORKER 2000 surfaces.
- b. Fantail recovery crew streams out the tow line with float attached near hook end
- c. Rescue Boat with swimmer escorts DEEPWORKER 2000 while ship maneuvers into recovery position.
- d. Maneuver YTT onto recovery course for best ride to minimize pitch and roll.

- e. Maneuver YTT until DEEPWORKER 2000 is astern at a comfortable distance parallel to tow line.
- f. Dive Supervisor deploys swimmer from YTT or Rescue Boat.
- g. Swimmer acquires tow line and connects to bow frame of DEEPWORKER 2000.
- h. Ship is maintaining bare steerage way into winds and seas using Omnithruster. Ship should not engage Z-drives.
- i. Swimmer rides the sub as the tow line straightens out and the ship begins to tow DEEPWORKER 2000.
- j. Swimmer attaches tag lines to port and starboard frame of DEEPWORKER 2000.
- k. Fantail crew tows DEEPWORKER 2000 into lift position.
- l. Chief Mate evaluates conditions. DEEPWORKER 2000 is in lift position. Chief Mate tells bridge to go All Stop.
- m. Chief Mate lowers lifting bridle into position.
- n. Swimmer connects lifting bridle and returns to the Rescue Boat.
- o. Chief Mate relays to bridge that Swimmer is out of the water and bridge may maneuver to maintain ship's head.
- p. Chief Mate evaluates conditions. Tells bridge to go All Stop if necessary or to maintain bare steerage way.
- q. Chief Mate initiates lift of DEEPWORKER 2000. Relays to bridge when DEEPWORKER 2000 is out of water and ship may now maneuver.
- r. Bridge maneuvers ship for best seas.
- s. Chief Mate lands DEEPWORKER 2000 on deck.

6. LIVE SHIP RECOVERY PROCEDURE DISABLED DEEPWORKER 2000 OR EXTREME WEATHER: (See Enclosure (1) for bridge checklist items)

- a. Rescue Boat and Swimmer are tending DEEPWORKER 2000.
- b. DEEPWORKER 2000 surfaces within _ mile of YTT. It is disabled or there are extreme weather conditions.
- c. Pull up transducers so YTT can maneuver as required.
- d. Place an extra person in rescue boat to assist with lines and Swimmer.
- e. Swimmer attaches tow line from Rescue Boat to DEEPWORKER 2000.
- f. Rescue Boat tows DEEPWORKER 2000 towards stern of YTT and Ship's tow line.
- g. Ship maintains station using only the forward Omnithruster.
- h. Rescue Boat maneuvers around Ship's tow line and tow DEEPWORKER 2000 across it.
- i. Swimmer enters the water and attaches the Ship's tow line to DEEPWORKER 2000 and detaches the Rescue Boat's tow line.
- j. YTT goes ahead slow using the Omnithruster to straighten out the tow and heads into wind and seas.
- k. Swimmer rides the sub as the tow line straightens out and the ship begins to tow DEEPWORKER 2000.
- l. Swimmer attaches tag lines to port and starboard frame of DEEPWORKER 2000.
- m. Fantail crew tows DEEPWORKER 2000 into lift position.

- n. Chief Mate evaluates conditions. DEEPWORKER 2000 is in lift position. Chief Mate tells bridge to go All Stop.
- o. Chief Mate lowers lifting bridle into position.
- p. Swimmer connects lifting bridle and returns to the Rescue Boat.
- q. Chief Mate relays to bridge that Swimmer is out of the water and bridge may maneuver to maintain ship's head.
- r. Chief Mate evaluates conditions. Tells bridge to go All Stop if necessary or to maintain bare steerage way.
- s. Chief Mate initiate lift of DEEPWORKER 2000. Relays to bridge when DEEPWORKER 2000 is out of water and ship may now maneuver.
- t. Bridge maneuvers ship for best seas.
- u. Chief Mate lands DEEPWORKER 2000 on deck.

7. LAUNCH AND RECOVERY PERSONNEL: (table)

Position	Description
Deck Crew (6 persons)	
Boatswain	Coordinates deck equipment and personnel
Line Tender Stbd	Tends stbd side tag line attached to sub
Line Tender Port	Tends port side tag line attached to sub
Crane Operator	Operates crane under direction of Boatswain
Tow LineWinch Operator	Operates tow line winch under direction of Boatswain
Tow Line Tender	Tends tow line
RHIB Crew (2 persons)	
Pilot	Pilots support vessel
Swimmer	Attaches and disengages tag liens, tow lines, and bridle from sub
Bridge Crew (1 person)	
Master	Positions vessel at direction of Boatswain
Dive Crew (5 persons)	
Dive Supervisor	Coordinates sub operations
Data Recorder	Records information during dive, monitors comms
Dive Tech 1	Pre-dive checkout support, dive support
Dive Tech 2	Pre-dive checkout support, dive support
Pilot	Pilots the sub

14 persons total

Launch and Recovery Photographs

YTT - Discovery Bay

June 18 - 29, 1999

Figure 1. *Aft weapons crane.*



Figure 2. *Tow line configuration.*



Figure 3. *Tow line guide.*



Figure 4. *Bridle strap attachment.*



Figure 5. *Launch.*



Figure 6. *Towing.*



Figure 7. *Recovery.*

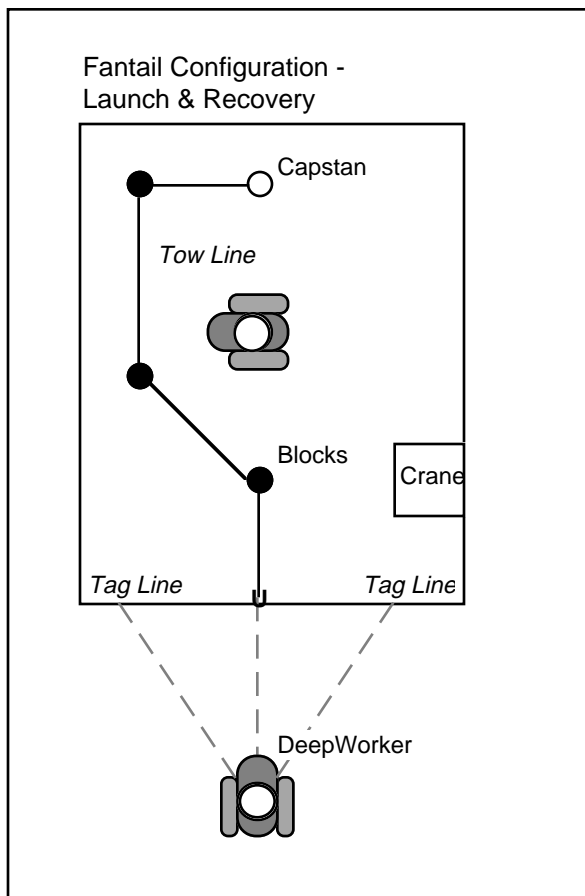


Figure 8. *The Discovery Bay.*



Sustainable Seas Expeditions Launch & Recovery Diagrams for the YTT

Discovery Bay



Notes:

The ship can use bow thrusters to move ahead as necessary. As an alternative recovery method, the RHIB can tow the DeepWorker across the tow line and drop off the swimmer to hook up lines for recovery.

Equipment:

- 1 Tow Line - 300 ft
- 2 Tag Lines - 50 ft each
- 1 Capstan
- 3 Blocks

Recovery Hook Up Procedure

